CLEAN ENERGY STAKEHOLDERS ATTEND THE ASIA CLEAN ENERGY FORUM

USAID SUPPORTS THE PARTICIPATION OF ASIAN DELEGATES

MANILA, PHILIPPINES – Thousands of clean energy professionals and government officials throughout Asia and beyond, including Kenya and the United States, attended the Asia Clean Energy Forum in June. The objective of the conference was to give these stakeholders the opportunity to network and share their knowledge on clean energy in Asia. The workshops during the conference focused on an array of topics including clean energy technologies, policy issues, and major challenges ahead.

The United States Agency for International Development (USAID) sponsored two Deep Dive pre-forum activities that focused on geospatial analysis and renewable energy grid integration. The Deep Dive workshops were organized in conjunction with the National Renewable Energy Laboratory (NREL) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Twenty five clean energy stakeholders were sponsored by USAID to attend these Deep Dive pre-forum activities at ACEF and the United States Energy Association (USEA) was responsible for coordinating their attendance. The countries that were represented by the selected few include Vietnam, India, Thailand, Laos, Kazakhstan, Indonesia, Bangladesh, and Cambodia.

PRE-FORUM SESSIONS

The first pre-forum activity was jointly coordinated by USAID and NREL with special presentations from CSTEP and NITI Aayog from India. The focus of the event was geospatial analysis for renewable energy. The workshop began with Anthony Lopez from NREL presenting on the fundamentals and importance of geospatial analysis. He explained that geospatial analysis is fundamental in determing resource, technical, economic and market potential of renewable energy. . The Enterprise Geospatial Toolkit (EGsT) is a desktop and web application framework that was developed by NREL and makes targeted geospatical analysis simpler for energy stakeholders. It accounts for not only wind and solar resources but also incorporates information relevant to energy development including

poverty, electric utility infrastructure and use, and environmental information. The added benefit is that the data can be downloaded and used in other geospatial analysis programs so users are not limited to only EGsT. After Lopez's explanation of geospatial analysis and the geospatial toolkit, a participant inquired if the tool will be transitioned to the cloud? If so, what challenges would countries face if the EGsT is used on an ongoing basis?

Jessica Katz, National Renewable Energy Laboratory (NREL)

Lopez explained that the analysis module of the EGsT framework already exists within the Amazon Cloud and that there is a push to dynamically scale resources based upon user requests. .

EGsT Case Studies

NREL has been working closely with India on developing their Enterprise Geospatial Toolkit (EGsT). Avik Sarkar spoke on behalf of NITI Aayog and explained that a major challenge in India is that the direction of the energy sector is split among multiple ministries. In order to maintain the energy, food and water nexus, quality data must be acquired for proper policy planning. He did state that the government of India plans to create a common energy data management platform to combat these issues. Continuing the discussion, Vaishalee Dash also spoke about the Indian context and challenges of power theft and social programs that offer free electricity in India. She discussed the EGsT and the ability to conduct sensitivity analyses and determine energy storage requirements with user inputs like capacity and land utilization. With renewable energy planning occurring rapidly in India, geospatial analysis becomes very important.

After discussing the benefits of geospatial analysis and how the toolkits work, attendees had the opportunity to participate in an interactive activity. They were given time to create their own analyses with the Enterprise Geospatial Toolkits of numerous countries in Asia. Data in the EGsT are country-specific so many participants were able to use the EGsT of their own country of origin.

DEEP DIVE: SCALING UP CLEAN ENERGY: EARLY ACTIONS TO FACILITATE INTEGRATION OF VARIABLE RENEWABLE ENERGY INTO EXISTING POWER SYSTEMS

The second pre-forum activity was coordinated by USAID, NREL, and GIZ. This workshop focused on early actions that can be taken to facilitate integration of variable renewable energy into power systems. The session kicked off with an interactive game of *Who Wants to Be a Grid Integration Millionaire* moderated by Jennifer Leisch of USAID. Questions were posed to the audience members on renewable energy and grid integration that kept audience members engaged and on their toes.

Anthony Lopez, National Renewable Energy Laboratory (NREL)

Dr. Jaquelin Cochran from NREL began the session presentations with myths and misconceptions about grid integration of renewable energy. She explained that the variability of renewables and the infamous duck curve can be very daunting to power system operators; however, flexible power systems are capable of achieving high penetrations of wind and solar (for example, 43% of Denmark's energy came from wind in 2015). With high levels of variable renewable energy, it no longer makes sense to think of baseload in the traditional sense. Cochran emphasized that wind and solar generators can provide grid services and contribute to resource adequacy if the appropriate physical and institutional systems are in place to enable them to do so.

Participant at the Mapping Pre-Form working with the Geospatial toolkit

GRID INTEGRATION CASE STUDIES

Prof. Dr.-Ing. Christoph Menke, Professor in the Joint Graduate School of Energy & Environment – King Mongkut's University of Technology Thonburi and Senior Energy Policy Advisor to GIZ, spoke on the experiences and lessons learned from Germany. He explained that Germany does not have much storage but there are many interconnections and operational practices such as wind and solar power forecasting that provide system flexibility. Flexibility within a system can be achieved but some questions need to be discussed before the design process starts, which means before a power purchase agreement with a renewable energy generator is even signed.

The India experience was presented by Ms. Shruti Deorah from the Central Electricity Regulatory Commission. She discussed India's recent interconnection of their five regional grids and their target of 175 GW of renewable energy capacity by 2022. India is establishing renewable energy management centers (REMCs) at regional and state load dispatch centers with the assistance of GIZ. In addition, there is a lot of investment going into smart infrastructure with real time communication.

EARLY ACTIONS FOR INTEGRATION OF VARIABLE RENEWABLE ENERGY (VRE)

After the two country case studies, the session transitioned into a panel discussion with RE Analytics, GIZ, and the Ministry of Energy. The panel discussion was an opportunity for participants to pose questions to the panelists. One attendee wanted clarification on why Germany did not flex coal power plants further down to 20%. To this GIZ responded that there is hesitance to bring coal down so low because most of Germany's capacity is tied into fixed and long term charges. Another attendee asked how geothermal would fit into the future of the Philippines. The panelists explained that mostly inflexible geothermal would be part of the energy mix, however, they did advise that it depends on the geothermal contract a country has. In the Philippines, geothermal was designed to be baseload so contracts may need to be reconsidered in the future. A third participant asked if the

energy demand of consumers can be measured; RE Analytics explained that it can be measured and forecasted for all consumer groups.

In continuation of forecasting, Jessica Katz of NREL gave a background on improved forecasting and its benefits. She explained that it is among the least expensive options to reducing the uncertainty of renewables and managing integration. Good forecasting improves efficiency and operations, whereas bad forecasting costs more and increases issues with reliability. Xcel Energy, a vertically-integrated utility in the United States, is a good case study because they include data and forecasting requirements in their PPAs.

Frank Siedel from GIZ and Edwin Lerch from Siemens presented on dispatch optimization and balancing power management. Siedel spoke about how much variable renewable energy should be added to a system and how it should be integrated. He explained that plans to scale up renewables need frequent updates; regulation, planning, and operations need to coordinate in order to be successful. Lerch discussed some of the issues within the German context including the lack of transport between countries in the European system. Some solutions he offered include system adaption, faster system planning, and flexible consumption (smart metering).

Jennifer Leisch, U.S. Agency for International Development

Clayton Barrows discussed how grid services can be utilized from renewable energy. He explained that there are evolving characteristics of wind and solar; it is becoming increasingly forecastable, dispatchable, and certain. Variable renewable energy can help offer additional flexibility and balance with added controls and through their incorporation into economic dispatch by the system operator.

BREAKOUT SESSION AND GROUP DISCUSSIONS

The day long workshop was kept lively and interactive with facilitated group discussions. During three rounds of Q&A, the speakers rotated through small groups of audience members for follow-up questions and clarifications. Many questions were asked during the three rounds including questions about incentivizing renewable energy, market mechanisms, sub-hourly dispatching, and forecasting standards, to name a few. A friendly debate even started between two enthusiastic audience members about forecasting and where the true benefit lies for renewable energy integration.

ENERGY STORAGE

To end the workshop, Rao Konidena from the Midcontinent Independent System Operator (MISO) spoke about energy storage. He explained that battery storage technology is still under development, but that storage must be competitive with conventional assets to become marketable. He explained that most utilities have some sort of storage capability and MISO is also attempting to accommodate more energy storage in their system. The future of energy storage and preparation for it lies in observing international markets and development. Yet, the key takeaway from Konidena's presentation is that markets need to be created from services that support the grid.

Dr. Rahul Walawalkar, Executive Director of the Indian Storage Alliance and Vice Chair of the Global Energy Storage Alliance, then provided an outlook for energy storage technologies, including pumped hydro, electrochemical batteries, capacitors and flywheels, and fuel cells. Beyond wind and solar integration, key emerging applications of energy storage include ancillary service provision, micro-grid support, and

electrification of the transport sector. Dr. Walawalkar emphasized the need for new markets, policies, and business models to accelerate the adoption of storage technologies around the world.

The workshop was brought to a close by GIZ who touched on the major topics discussed throughout the day including grid integration, forecasting, energy storage, ramping up renewables and energy security worldwide.

INTERNATIONAL DELEGATES

Mr. Ho Ngoc Huong, Vietnam
Mr. Trinh Quang Ninh, Vietnam
Mr. Quach Quang Dong, Vietnam
Mr. Nguyen Long Thanh, Vietnam
Ms. Pimnipa Sepongam, Thailand
Mr. Witawat Kraiwit, Thailand
Mr. Poom Phogun, Thailand
Mr. Bounoum Syvanpheng, Laos
Mr. Songkane Somsavanh, Laos
Mr. Chantho Milattanapheng, Laos
Mr. Khanthara Sisamouth, Laos
Mr. Yerzhigit Bapin, Kazakhstan
Ms. Etis Dwi Meilandari, Indonesia
Ms. Siti Munawaroh, Indonesia
Mr. Ishak Burhani Nasution, Indonesia
Mr. Budi Mulyono, Indonesia
Ms. Shruti Deorah, India
Dr. Dev Raj Birdi, India
Mr. Akshayakumar Sundaram, India
Dr. Avik Sarkar, India
Ms. Vaishalee Dash, India
Dr. Mao Hak, Cambodia
Engr. A.T.M. Fazlul Karim   Bangladesh
Mr. Nur Mohammad, Bangladesh